

EFFECT OF TRAFFIC VOLUME AND
SHOULDER WIDTH TOWARDS CRASH
CASES AT JALAN KUANTAN BYPASS

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Jalan Kuantan Bypass dikenali sebagai jalan yang mempunyai kadar kemalangan yang tinggi. Pembangunan yang pesat sepanjang jalan bersama dengan penubuhan banyak industri yang baru di kawasan telah dikaji sebagai faktor utama untuk isu ini. Kajian ini bertujuan untuk mengkaji kesan-kesan jumlah kenderaan dan lebar bahu jalan terhadap kes kemalangan yang terjadi di Jalan Kuantan Bypass. Kemalangan jalan raya boleh berlaku dalam beberapa sebab termasuk kecuaiannya pemandu, keadaan jalan, keadaan kenderaan, dan keadaan cuaca. Thesis ini memberi tumpuan kepada dua (2) kategori iaitu jenis kenderaan dan kelebaran bahu Jalan Kuantan Bypass. Semua data dikumpulkan di tapak pada hari minggu dan hari hujung minggu sepanjang 2.2km, jalan bermula daripada persimpangan isyarat berdekatan lampu isyarat persimpangan Wisma Belia sehingga lampu isyarat persimpangan Bukit Rangan. Hubungan antara komposisi kenderaan, kelebaran bahu jalan dan kes-kes kemalangan jalan raya menggunakan analisis regresi berganda. Model ini menjelaskan kemalangan dengan 61% ($r\text{-kuadrat}=0.611$) dan terbukti bahawa kenderaan berat dan lebar bahu secara statistik signifikan terhadap tahap kemalangan ($p = 0.0001$, $p < 0.001$). Hasil yang dijana dari kajian ini diharapkan dapat memberikan inspirasi kepada pihak berkuasa tempatan Kuantan untuk menghasilkan pelan yang betul untuk menyelesaikan gangguan kenderaan berat ke aliran lalu lintas di Jalan Kuantan Bypass.

ABSTRACT

Kuantan Bypass is known for having a very high vehicles crash rate from year to year. Rapid development along the roads together with establishments of many new industrial areas in the road surrounding area have been observed as the main factor for this issue. This study aims to investigate the effect of vehicles and shoulder width towards high number of crash cases along Jalan Kuantan Bypass. Crashes occur due to several reasons which include drivers' negligence, road conditions, vehicle conditions and weather conditions. This thesis will mainly focus on 2 categories of data namely, vehicles and shoulder width. All data were collected on site during weekdays and weekend along 2.2 km road starts from signalized intersection near Wisma Belia until signalized intersection at Bukit Rangin. Relationship between traffic volume, shoulder width and crash cases was generated using multiple regression analysis. The model shows that the multiple regression is explaining the severity of crash by 61% ($r\text{-squared} = 0.611$) and it is proven that vehicles and shoulder width is statistically significant to the severity of crash ($p = 0.0001$, $p < 0.001$). The outcomes generated from this study is hope to give an insight to the Kuantan local authority in producing proper plan to solve the interruption of heavy vehicles to traffic flow at Jalan Kuantan Bypass.

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LIST OF SYMBOLS

X_1	Independent Variable -Vehicles Classification (Car and Motorcycle)
X_2	Independent Variable- Shoulder width
X_3	Independent Variable – Heavy vehicles
Y	Number of Crash
B_n	Regression coefficient of the nth independent variable

LIST OF ABBREVIATIONS

PDRM	Polis Diraja Malaysia
PWD	Public Work Department
MoT	Ministry of Transportation

CHAPTER 1

INTRODUCTION

1.1 Introduction

In 2004, the World Health Organization stated that the frequency of deaths from road crashes became the ninth causing the death in the world. The World Health Organization predicts that the frequency of death caused by bad crashes will be the fifth in 2030. The number of accidents reported may be underestimate. The actual number of accidents may be higher than the official statistics of crash. This is because not all of the crashes were reported to the police station.

The Malaysian government has been held responsible in looking after road safety in Malaysia. After Malaysia achieved independence in 1957, many bodies involved with road safety have been formed for example voluntary sector, government departments and private sector. A Cabinet Committee on Road Safety was set up in Malaysia and chaired by the Prime Minister to monitor and conduct research so that roads in Malaysia are better and more convenient to reduce traffic accidents.

Since the development of technology and economic growth, vehicle demand has also increased in Malaysia. As a results, crashes in Malaysia continue to rise and become serious due to the increase in vehicles on the road. In 2009, for example, the Malaysian government spent RM 9.3 billion as a result of traffic crashes(MIROS, 2016)(Abdelfatah, 2016).

Crashes usually come from a combination of four (4) elements namely drivers, roads, weather and vehicles. Crashes are often caused by drivers and are affected by vehicle conditions, roads or weather. Accidents can be reduced with changes in vehicle design, road geometry, surrounding road conditions, driver behaviour. If there are any factors that cause road crashes, it needs to change and improve the highway system.

To reduce road accidents, planning and research need to be carried out. Crash prediction models can be used to help in assessing the level of road safety during highway planning. Crash Prediction Model is used for the purpose of establishing Infrastructure Coefficient, as a result of obtaining a whole on road safety by using independent variables.

Road safety is becoming a big issue until now when the number of crashes is still huge despite the various programs that have been done. Table 1 shows statistical data on road crashes 2008 to 2015. The number of vehicles crashes and fatal shows an increment from year by year. While the number of serious and minor injury caused by vehicles crash decrease since 2008 until 2015.

Table 1.1 The general statistic in Malaysia of road crash

Year	Crash	Fatal	Serious Injury	Minor Injury
2008	373,071	6,527	8,868	16,879
2009	397,330	6,745	8,849	15,823
2010	414,421	6,872	7,781	13,616
2011	449,040	6,877	6,328	12,365
2012	462,423	6,917	5,868	11,654
2013	477,204	6,915	4,597	8,388
2014	476,204	6,674	4,432	8,598
2015	489,606	6,706	4,120	7,432

Source: Annual Transport Statistic 2008 to 2015.
(Ministry of Transport (MOT), 2017)

1.2 Background Study

Most people are unaware of how large a problem of unsafe traffic operation worldwide. The tragic consequence of vehicles crash puts unsafe traffic operations on a par with war or drug use, as an example of irresponsible social behaviour that must change. This lack of awareness and responsibility may be an important reason why more than 500,000 people are killed per year or about one life every minute and over 15 million suffer injuries as a result of road accidents every year worldwide(W. Organization, 2004).

Road crashes depend on various mechanical, behaviour and environment factors. These factors vary in space and time. Therefore, the incidence of road crashes and fatalities also vary at both spatial and temporal scales. From the previous accident analysis record, every year more than 1.17 million people die in road crashes around the world. It has been estimated that at least 6 million more will die and 60 million will be injured during the next 10 years in developing countries unless urgent action is taken(W.Organization, 2004).

The main cause of road crashes in Malaysia is because of the attitude and behaviour of people(Abdelfatah, 2016). Humans often drive using emotions when driving. According to reports from the Royal Malaysian Police, PDRM (2006), 90% of road crashes occurred due to humanity. The causes of road accidents are drivers who often disobey traffic safety laws, including driving under the influence of alcohol, illegal racing, driving in dangerous conditions, disturbing emotions, driving in tired conditions, and driving in high speed (NHTSA 2010). Speed is also one of the common causes of road accidents in Malaysia. Speeding is also based on road conditions, lighting, weather, and traffic areas. Although the Malaysian government has installed speed traps, it still cannot prevent Malaysian drivers to speed up and drive in dangerous conditions(Umar & Professot, 2005).

1.3 Problem Statement

Malaysia has achieved success in many fields including in economic activities. As a developing country, transportation and road network has become an important tool in building the nation as it connects different states in Malaysia. Therefore, there is a need for safe and modern road infrastructure to be used for all road users. A set of road law has been imposed by Road Safety Department and Malaysian Institute of Road Safety Research to ensure a systematic road system regulated for all types of road conditions and the ever increasing volume of traffic year to year.

Data from Royal Malaysia Police (PDRM) highlights that in average, 18 to 20 crashes happen daily on Malaysian roads. Their data further indicates that in 2014, 2,208 crash cases, from the total of 16,763, were rear collisions; and out of that, 1,289 cases contributed to fatalities and serious injuries of the victims. Most accidents happen due to driver negligence. However, the frequency of accidents, the severity of the crash can be

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